What is claimed is:

1. A biosensor for bone mineral density measurement, comprising:

a stimulating source for supply of energy;

a transducer immobilized with antibodies against TRAP 5a, TRAP 5b or total TRAP thereon;

a signal detecting unit for detecting signal changes from said transducer; and

a signal processing unit for retrieving and analyzing said signals.

2. The biosensor according to Claim 1, wherein said transducer comprises cantilever beam, surface acoustic wave (SAW) device or quartz crystal microbalance (QCM) sensor.

3. The biosensor according to Claim 1, wherein said stimulating source is light source having wavelength ranging between 635 nm and 850 nm when said transducer is cantilever beam.

4. The biosensor according to Claim 3, wherein said light source is laser or laser diode.

5. The biosensor according to Claim 1, wherein said stimulating source is voltage or current source when said transducer is surface acoustic wave device or quartz crystal microbalance sensor.

6. The biosensor according to Claim 5, wherein said stimulating source is a power supply.

7. The biosensor according to Claim 2, wherein said cantilever beam can be in the form of triangular, rectangular or array configuration.

8. The biosensor according to Claim 1, wherein biomolecules immobilized on said

transducer are antibodies against total TRAP or TRAP 5b.

9. The biosensor according to Claim 1, wherein said signal processing unit can detect the change of transducer signals produced due to change of its mass, where the signals are processed/transmitted via build-in circuits.

10. The biosensor according to Claim 1, wherein said signal processing unit comprises signal retrieval interface, analytical computing program and control interface.

11. The biosensor according to Claim 10, wherein said control interface is for controlling said stimulating source and transducer.

12. A biosensor for measuring bone mineral density, comprising:

a stimulating source;

a substrate having at least on cantilever beam disposed thereon, wherein the surface of said cantilever beam is immobilized with antibodies against TRAP 5a, TRAP 5b or total TRAP;

a signal detecting unit for detecting signal changes from said transducer; and

a signal processing unit for retrieving and analyzing said signals.

13. The biosensor according to Claim 12, wherein said stimulating source is laser or laser diode.

14. The biosensor according to Claim 12, wherein said signal detecting unit comprises a position sensitive detector for detecting deflection or shift in resonance frequency of said transducer caused by mass change.

15. The biosensor according to Claim 14, wherein the signals of deflection or resource frequency shift can be further amplified optically.

16. The biosensor according to Claim 12, wherein biomolecules immobilized on said transducer are antibodies against total TRAP or TRAP 5b.

17. A method for measuring bone mineral density, comprising the steps of:

obtaining a test specimen containing TRAP, TRAP 5a or TRAP 5 b;

letting said specimen contact and react with a transducer immobilized with antibodies against TRAP 5a, TRAP 5b or total TRAP;

detecting the change of transducer signals;

analyzing said signals;

computing the concentration or activity of TRAP, TRAP 5a or TRAP 5b in the specimen based on the change of signals; and

determining the change in bone mineral density based on the concentration or activity of TRAP, TRAP 5a or TRAP 5b obtained thereof.

18. The method according to Claim 17, wherein said test specimen is serum, blood or other body fluid containing TRAP, TRAP 5a or TRAP 5b.

19. The method according to Claim 17, wherein said transducer comprises cantilever beam, surface acoustic wave device (SAW) or quartz crystal microbalance sensor (QCM).

20. The method according to Claim 17, wherein biomolecules immobilized on said transducer are antibodies against total TRAP or TRAP 5b.

21. The biosensor according to Claim 1, wherein said TRAP comprises TRAP 5a and TRAP 5b.

22. The method according to Claim 14, wherein said TRAP comprises TRAP 5a and TRAP 5b.